DLA Piper LLP (US)
401 B Street, Suite 1700
San Diego, California 92101-4297
www.dlapiper.com

Mike Tracy
mike.tracy@dlapiper.com
T 619.699.3620
F 619.764.6620

April 8, 2013
VIA E-MAIL IHONMA@WATERBOARDS.CA.GOV

Ms. Lisa Honma
California Regional Water Quality Control Board
San Diego Region
9174 Sky Park Court, Suite 100
San Diego, CA 92123-4340

Re: Solar Turbines Incorporated's Comments on the Basin Plan Amendment to Incorporate Total Maximum Daily Loads for Toxic Pollutants in Sediment at the Mouths of Paleta, Chollas, and Switzer Creeks in San Diego Bay

Dear Ms. Honma:

On February 28, 2013, Mr. Charles Cheng of the San Diego Regional Water Quality Control Board ("Water Board") provided the February 19, 2013 Draft Technical Report for Paleta, Chollas, and Switzer (CPS) Total Maximum Daily Loads ("TMDLs") to all Downtown Anchorage and B Street/Broadway Piers stakeholders for review. Accordingly, Solar Turbines Incorporated ("Solar") submits its comments to that report.[1] Solar expressly preserves, and does not waive, any and all objections to the issues raised in the report or to issues relating specifically to the Downtown Anchorage Area that Solar does not address herein.

I. SUMMARY

The numeric targets presented in the draft TMDL document are artificially low likely by a substantial degree with respect to identifying the concentrations of chlordane, total PAHs and total PCBs that result in adverse biological effects in San Diego Bay. This is a consequence of flaws in the methodology used to develop the numeric targets. These flaws include:

- Failure to consider variability in chemical mixtures throughout San Diego Bay;
- Truncation of the distribution of 'no-effects' data for each chemical through the use of the sediment chemistry line of evidence (LOE) from the California Sediment Quality Objectives (SQOs); and
- Calculation and use of a statistic that does not represent the variability of individual samples within a reference data set.

[1] Solar retained Integral Consulting Inc. for purposes of evaluating the Draft Technical Report for Paleta, Chollas, and Switzer (CPS) Total Maximum Daily Loads and much of the content of these comments is derived from that analysis.

A more appropriate methodology is to use only the biological effects data to identify the 'no-effects' data set, and to use a statistic representing the upper bound of the distribution of each chemical of concern within that data set.

II. BACKGROUND

According to the draft TMDL document, numeric targets for chlordane, total PAHs, and total PCBs are intended to represent sediment concentrations protective of benthic communities. These numeric targets were developed by using the Aquatic Life SQO Multiple Lines of Evidence ("MLOE") approach to develop a dataset that represented "unimpacted" conditions (i.e., the reference area dataset) for which a 95 percent upper confidence limit ("UCL") of the mean concentration of each chemical could be calculated and used as the numeric target for that chemical. The SQO approach is based on the integration of three individual LOEs: sediment toxicity, benthic community condition, and sediment chemistry. According to the TMDL document, this approach to developing numeric targets was initially developed by Thompson et al. (2009) of the San Francisco Estuary Institute Aquatic Science Center.

To calculate the numeric targets for the TMDL document, the MLOE approach was used to classify stations into the following six assessment categories:

- 1 – Unimpacted
- 2 – Likely Unimpacted
- 3 – Possibly Impacted
- 4 – Likely Impacted
- 5 – Clearly Impacted
- 6 – Inconclusive

To develop the numeric targets, only stations from Categories 1 and 2 were included in the reference area dataset.

The SQO methods and MLOE approach were developed to assess the sediment quality (or degree of benthic impairment) at individual stations.[2] However, as noted by Thompson et al. (2009), "the SQO methods do not identify which contaminants may be associated with impacts or provide concentration thresholds for apparent biological impacts."[3] In addition, there is no specific guidance in the SQO methods as to how they should be used to develop toxicity thresholds, such as the numeric targets in the TMDL document. Therefore, development of numeric targets requires the application of methods other than the SQO methods.

The numeric targets identified in the TMDL document are artificially low, likely by a substantial degree, as the result of the technically flawed method that was used to develop them. In particular, it is inappropriate to include the Sediment Chemistry LOE in the evaluation of potential stations for the reference area dataset. This is because sediment in most areas of San Diego Bay is affected by multiple co-occurring chemicals, the presence of which will likely confound the potential relationship between chlordane, total PAHs, and total PCBs and any observed benthic impairment. For example, in their sediment quality evaluations for San Diego Bay, Thompson et al. (2009) concluded that "covarying sediment mixtures were usually significantly associated with benthic and/or toxic impacts", and that "there was no evidence that any individual contaminant may be responsible for biological impacts."[4]

The presence of multiple co-occurring chemicals could falsely implicate the three chemicals of concern in a toxicity determination. Use of this methodology cannot reach any conclusions on the relationship of the chemicals of concerns to benthic impairment with any scientific certainty. That is, those three chemicals of interest could be implicated in causing toxicity at particular stations when, in fact, the toxicity was due to one or more other chemicals rather than the specific chemical of concern. This will result in those stations being erroneously excluded from the reference area dataset for chlordane, total PAHs, and total PCBs. The exclusion of these stations will then produce an inappropriately constrained dataset with artificially low numeric targets.

---

[2] SWRCB. 2009. Water quality control plan for enclosed bays and estuaries – Part 1 Sediment Quality. State Water Resources Control Board, California Environmental Protection Agency, Sacramento, CA.
[3] Thompson, B, Melwani, A.R., and Hunt, J.A. 2009. Estimated sediment contaminant concentrations associated with biological impacts at San Diego Bay clean-up sites. SWRCB Agreement No. 08-194-190, Contribution No. 584. Aquatic Resource Center, Oakland, CA.
[4] *Id.*

The following comments provide more specific details on limitations of the approach used in the TMDL document, and recommend modifications of the method to develop technically valid numeric targets.

III. SPECIFIC COMMENTS

A. Co-Varying Chemicals Lead to Artificial Underestimates of Numeric Targets

To develop the numeric targets for sediment, the Aquatic Life sediment SQO approach was used with a dataset that included samples from throughout the Bay, including from contaminated sites such as the mouths of the three subject creeks, the B Street/Broadway Pier site, and the Downtown Anchorage Site. As discussed previously, Thompson et al. (2009) found that most stations in San Diego Bay contain mixtures of co-occurring chemicals, including chemicals other than those for which TMDLs are developed.[5] When chemical mixtures are present, effects cannot be definitively attributed to any specific chemical with certainty. In particular, effects cannot be attributed to the subset of chemicals for which the numeric targets are developed. The set of stations in SQO categories 1 and 2 ("unimpacted" and "likely unimpacted," respectively) will not include stations where effects are caused by a non-TMDL chemical, and where the concentrations of TMDL chemicals would not result in adverse effects. This reduces both the number of samples used to calculate 'no-effect' concentrations, and because of covariance among chemical concentrations, is likely to result in a set of samples in which there are no concentrations of TMDL chemicals that are slightly elevated but not enough so to cause adverse biological effects. Reducing the number of samples reduces the variance and leads to a lower upper confidence limit. Skewing the data set to include only low concentrations also leads to a lower upper confidence limit. The consequence is numeric targets for the TMDL chemicals that are artificially low by a substantial degree.

According to Appendix I of the subject document, the sediment chemistry LOE for the SQO assessment was calculated using data for sixteen chemicals, including 11 that are not chemicals of concern at the creek mouths (i.e., cadmium, copper, lead, mercury, zinc, dieldrin, trans nonachlor, and four forms of DDT). Because the chemicals of concern at the creek mouths are chlordane, total PAHs, and total PCBs, any determination of numeric targets should focus solely on those chemicals and should not include data where adverse effects might be

[5] SCCQRP and SPAWAR. 2005. Sediment Assessment Study for the Mouths of Chollas and Paleta Creek, San Diego. Phase I Final Report. Prepared for the San Diego Regional Water Quality Control Board by the Southern California Coastal Water Research Project, Westminster, California, and the Space and Naval Warfare Systems Center, San Diego, California.

caused by other co-occurring chemicals. If co-occurring chemicals are present at toxic levels, they can result in numeric targets that are unrealistically low for the chemicals of concern. To illustrate, if the true toxicity threshold for total PCBs is in the range of 3,000 µg/kg, one would not expect to find toxicity at stations with lower concentrations. However, if stations with total PCB concentrations of 500, 1,500, 2,000 and 2,500 µg/kg were affected by toxic levels of nickel, for example, those stations would be excluded from the set of samples used to calculate numeric thresholds because of the observed toxicity, regardless of the fact that the toxicity was due to nickel instead of total PCBs. This exclusion could therefore result in a reference data set with no PCB concentrations greater than 500 µg/kg and thereby generate a numeric target that was much lower than the true toxicity threshold of 3,000 µg/kg, simply as an artifact of the co-occurrence of nickel with PCBs. In this manner, the numeric target developed for total PCBs would be inaccurate and artificially low.

One method of minimizing the potential confounding effects of co-occurring chemicals is to develop toxicity thresholds using only stations at which no biological effects were found. The strength of this approach is that despite the presence of co-occurring chemicals, it is known that the chemical of interest was not toxic at the concentrations found at the no-effect stations, regardless of the presence of co-occurring chemicals. The development of protective toxicity thresholds at the Shipyards Site was conducted, in part, using a similar approach based on evaluations of the no-effect data. Following this method will produce more accurate numeric targets for the chemicals of concern.

B. Biological Effects Should be the Sole Criterion for Selecting the Reference Area Data Set

All stations categorized as "unaffected" or "low effect" based on the toxicity and benthic condition LOEs should be included in the reference area dataset, independent of sediment chemistry. Because the chemistry LOE has a disproportionate effect on the station assessment matrix (Table 11 of the SQOs), the selection of stations for the reference area dataset should be independent of the chemistry LOE, and based solely on the severity of biological effects (Table 9 of the SQOs). The disproportionate influence of the chemistry LOE on the station assessment matrix was discussed in previous comments.[6] Because the objective of the TMDLs is to protect benthic macroinvertebrate communities, the numeric targets should be based only on information that directly relate to the health of those communities (i.e., sediment toxicity tests

[6] Jan. 24, 2013, Solar Turbines Incorporated's Comments on the January 10, 2013 Public Workshop and CEQA Scoping Meeting as to the Downtown Anchorage and B Street/Broadway Piers' TMDLs for Toxic Pollutants in Sediments, § II.

and benthic community evaluations), and should not be controlled by indirect inferences about possible effects due to sediment chemistry. Sediment chemistry should enter the analysis only after the reference area dataset has been selected, when the numeric targets are calculated. This approach will minimize the confounding effects of co-occurring chemicals that are present at elevated concentrations at stations where concentrations of TMDL chemicals (i.e., chlordane, total PAHs, and total PCBs) are not elevated. As described in the previous comments, those stations would be excluded from the reference area data set based on elevated concentrations of the co-occurring chemicals rather than chlordane, total PAHs, and total PCBs. In that manner, some stations at which chlordane, total PAHs, and total PCBs are not causing toxicity would be eliminated from the reference area dataset for those three chemicals and likely result in numeric targets that are artificially low by a substantial degree.

C. Category 3 Samples Should be Included in the Data Set

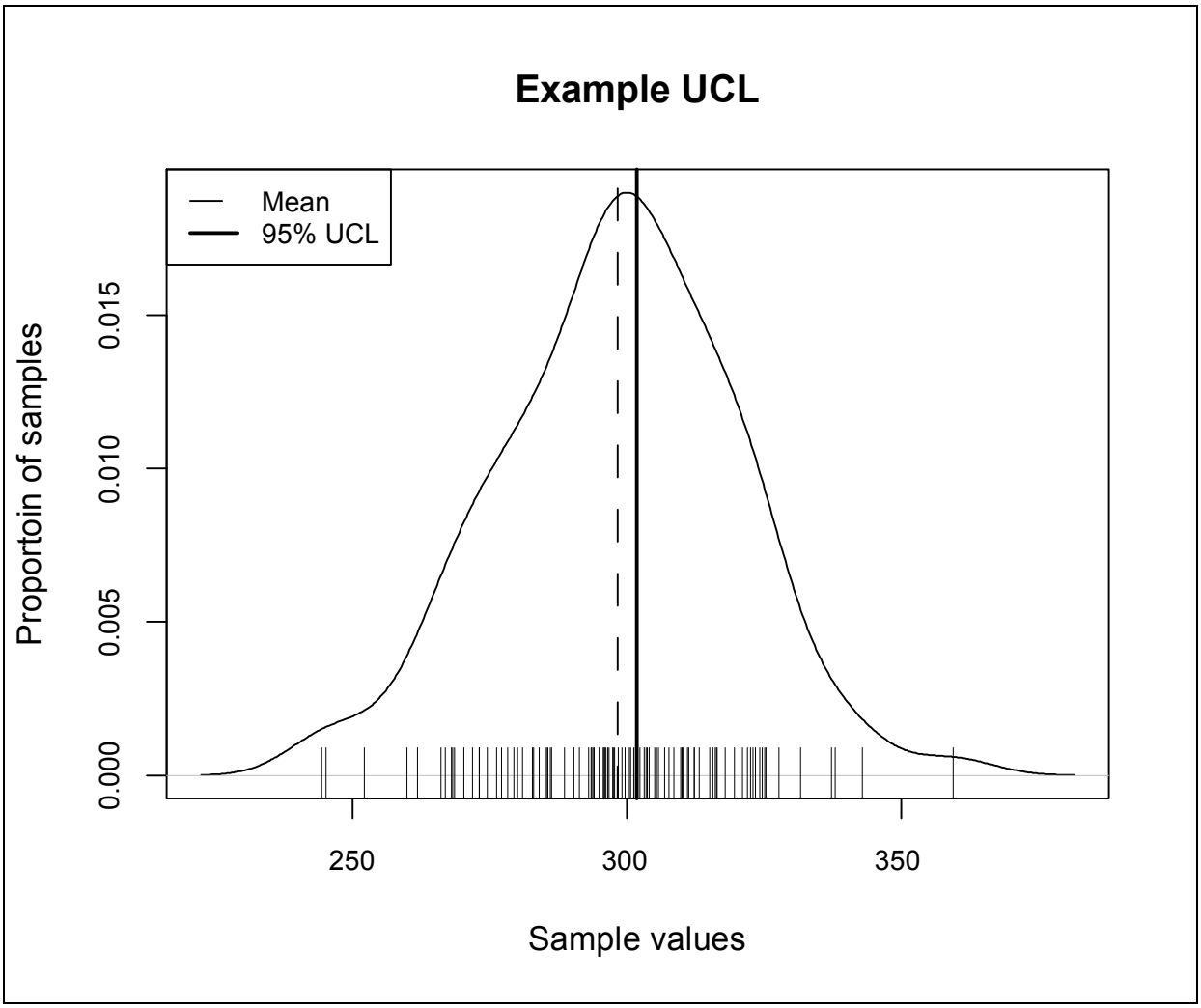
All Category 3 ("potentially impacted or inconclusive") stations should be included in the reference area data set because they show no evidence of meaningful biological effects. That is, the severity of effects of Category 3 stations is "low effect" (i.e., the same effects category as Category 1 and 2 stations). In addition, the potential for chemically mediated effects at Category 3 stations is Moderate Potential (i.e., the same category as Category 1 and 2 stations that are Unaffected with respect to severity of effect). The biological results of the Category 3 stations should take precedence over the sediment chemistry results because they are more directly related to the protection of benthic macroinvertebrate communities. The fact that sediment chemistry may be slightly elevated at those stations is no measure of corresponding biological effects, especially if chemical bioavailablity is low. By contrast, the biological results provide direct and unambiguous determinations of the severity of effects.

D. An Upper Confidence Limit on the Mean Limits the Usability of the Numeric Targets

The numeric target values in the draft TMDL document have been calculated as the UCL of the mean concentration in the reference area dataset. The UCL is a statistic that describes the level of certainty in the average (mean) value of reference area samples. Stated differently, the mean has been calculated with a 95% confidence level as to its accuracy. Therefore, this value is only appropriate for evaluation of the mean of another population of samples (or as a comparison to a mean concentration at a potentially contaminated site).

The relationship of the UCL to individual data points in a data set is illustrated by the following figure. This figure shows 100 data points, where the sample values are representative of

concentrations that might be measured in a reference area. Both the mean and the 95% UCL of these data points are shown on the figure. As the figure shows, the UCL is relatively close to the mean. Of these 100 data points, 43 are higher than the 95% UCL. If this 95% UCL value were used to evaluate data points from a site that was actually equivalent to the reference area, 43% of those site samples would also be expected to fall above the 95% UCL. Those 43 site samples are still below the upper limit of sample concentrations at the unimpacted reference area though.



Accordingly, and as this example shows, to support decision-making about individual locations within a site, a numeric target should be based on a statistic that characterizes the distribution of individual points in the reference area data set, rather than characterizing the uncertainty of the mean value. An appropriate statistical approach is an estimate of the upper limit of concentrations within the reference area data set. Any site station that is below such a numeric target is within the range of reference conditions. The upper limit of concentrations within the reference area data set can be estimated by computing a tolerance limit (an upper confidence limit on an upper percentile of the data, such as a 95% confidence limit on the 95th percentile), or by simply taking the maximum no-effect concentration within the reference area data set.[7] The suggested approach is well grounded in the literature and the California State Water Resources Control Board has in the past used a similar approach to what we suggest.[8]

IV. RECOMMENDATION

An alternative approach to developing numeric targets for chlordane, total PAHs, and total PCBs—or for any other chemicals at other locations—would be to select stations for the reference area dataset based only on the Sediment Toxicity and Benthic Condition LOEs. This approach is consistent with the stated objective of the TMDL document to develop numeric targets that are protective of benthic communities, because those two LOEs are directly related to the health of those communities. In addition, this approach will minimize the confounding effects of co-occurring chemicals because it ensures that no biological effects were found at the concentrations of chlordane, total PAHs, and total PCBs in the reference area dataset regardless of the presence of co-occurring chemicals.

For the numeric targets to be effective at identifying important variability in conditions within a potentially contaminated site, the numeric targets should be an upper bound on the distribution of no-effects data. An upper tolerance limit and the maximum no-effect value are both reasonable representations of the upper bound of no-effects data.

In summary, because the SQO methods do not provide guidance as to how chemical-specific toxicity thresholds should be developed, alternate or supplementary methods are needed to

---

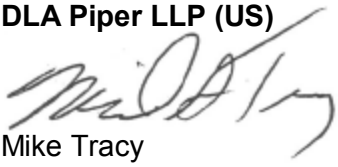
[7] The maximum no-effect concentration is equivalent to a no-observed-adverse-effects level ("NOAEL") value if biological data are the sole basis for determining the presence of biological effects. CSWRCB. 1998. Evaluation and Use of Sediment Reference Sites and Toxicity Tests in San Francisco Bay. Final Report. Prepared by the California State Water Resources Control Board, San Francisco Bay Regional Water Quality Control Board, California Department of Fish and Game, and Institute of Marine Sciences, University of California Santa Cruz at Comment 2. April 1998.

[8] *Id.*

develop the TMDL numeric targets. The method selected to develop the targets must be technically valid and not overly affected by confounding factors such as the presence of co-occurring chemicals. The most technically valid numeric targets can only be developed by focusing on the information provided at the stations where biological effects were not found and by using an upper bound of the concentration data within this data set.

Sincerely,

DLA Piper LLP (US)



Mike Tracy
Partner

Admitted to practice in California

cc: Charles Cheng, San Diego Water Board (ccheng@waterboards.ca.gov)

WEST\240835881.2